11/16/2005 10/708936 Doty

31/5/4
DIALOG(R)File 2:INSPEC

05935711 INSPEC Abstract Number: B9506-2575-002
Title: MEMS fabrication by Lithography and Reactive Ion Etching (LIRIE)
Author(s): Rangelow, I.W.; Hudek, P.
Author Affiliation: Inst. of Tech. Phys., Kassel Univ., Germany
Journal: Microelectronic Engineering vol.27, no.1-4 p.471-4
Publication Date: Feb. 1995 Country of Publication: Netherlands
CODEN: MIENEF ISSN: 0167-9317
U.S. Copyright Clearance Center Code: 0167-9317/95/$09.50
Conference Title: Micro- and Nanoengineering 94. International Conference on Micro- and Nanofabrication
Conference Sponsor: Ciba-Geigy; CSEM; Daimler Benz Finds; ETH; et al
Conference Date: 26-29 Sept. 1994 Conference Location: Davos, Switzerland
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: This paper reports on the development of a technology which will offer the potential to manufacture micro-engines, micro-turbines, micro-sensors, micro-actuators, and electronic circuits onto a single silicon chip. Axes or stators (nonmoving parts) are etched into the initial Si-wafer. The movable parts (rotors, beams, etc.) are prepared from electro-chemically etched Si-membranes with defined thicknesses. Both sides of the Si-membrane are covered with a 1.5 mu m SiN/sub x/O/sub y/ layer by a low stress (<70 MP) PECVD-process. After that, all movable parts are created lithographically on the SiN/sub x/O/sub y/ surface. This is followed by dry etching the mono-crystalline Si-membrane down to the SiN/sub x/O/sub y/ sacrificial layer on the back side of the membrane by an RIE-process. This fixes the movable parts to the SiN/sub x/O/sub y/-layer. The wafer with the movable parts is flipped onto the wafer with the already etched axis and then positioned and centred. The SiN/sub x/O/sub y/-sacrificial layer is then dissolved by a chemical wet or vapour etch process. Subsequent bonding with a Pyrex glass wafer seals the parts. (5 Refs)
Subfile: B
Descriptors: lithography; micromechanical devices; plasma CVD coatings; semiconductor technology; sputter etching
Identifiers: micro-engines; micro-turbines; micro-sensors; micro-actuators; electronic circuits; single silicon chip; MEMS fabrication ; manufacture; LIRIE; lithography; reactive ion etching; electro-chemically etched wafer; low stress PECVD-process; dry etching; mono-crystalline Si-membrane; SiN/sub x/O/sub y/-sacrificial layer; chemical wet etch; vapour etch; bonding; Pyrex glass wafer seals; Si-SiON
Class Codes: B2575 (Micromechanical device technology); B2550G (Lithography); B2550E (Surface treatment for semiconductor devices)
Chemical Indexing:
Si-SiON int - SiON int - Si int - N int - O int - SiON ss - Si ss - N ss - O ss - Si el (Elements - 1,3,3)

? ds

31/5/2
DIALOG(R)File 2:INSPEC

06624984 INSPEC Abstract Number: B9708-2575-022
Title: Etching processes for high aspect ratio micro systems technology (HARMST)
Author(s): Kassing, R.; Rangelow, I.W.
Author Affiliation: Inst. of Tech. Phys., Kassel Univ., Germany
Journal: Microsystem Technologies vol.3, no.1 p.20-7
Publisher: Springer-Verlag,
Publication Date: Nov. 1996 Country of Publication: Germany
CODEN: MCTCEF ISSN: 0946-7076
SICI: 0946-7076(199611)3:1L.20:EPHA;1-T
Material Identity Number: F257-97005
Language: English Document Type: Journal Paper (JP)
Treatment: Experimental (X)
Abstract: This paper reports on the development of a dry etching based HARMS-Technology which will offer the potential to manufacture micro-engines, micro-turbines, microsensors, micro-actuators, and electronic circuits onto a single silicon IC chip. This technology is based on the highly anisotropic and selective dry etching of Si-monocrystals. The suitability of reactive ion etching for the fabrication of micro electro mechanical systems (MEMS) has been evaluated by characterising the change of lateral dimensions vs. depth in etching deep structures in silicon. Fluorine, chlorine and bromine containing gases have provided the basis for this investigation. A conventional planar RIE (Reactive Ion Etching) reactor has been used, in some cases with magnetic field enhancement or ICP (Inductive Coupled Plasma) Source and low substrate temperature. For reactive ion etching based on Cl/sub 2/ or Cl/sub 2//HBr plasma a slightly "positive" (top wider than bottom) slope is achieved when etching structures with a depth of several 10 mu m, whereas a "negative" slope is obtained when etching with an SF/sub 6//CCl/sub 2/F/sub 2/ based plasma. Pattern transfer with vertical walls is obtained for reactive ion etching based on SF/sub 6/ (with O/sub 2/, added) when maintaining the substrate at low temperature(in range approximately=-100 degrees C). Further optimisation of plasma chemistries and reactive ion etching procedures should result in runouts in the order or 0.1 mu m/100 mu m depth in Si as well as in organic materials. Etching processes for HARMST is demonstrated in the realisation in Si microturbine. Axes or stators (nonmoving parts) are etched into the initial Si-wafer. The movable parts (rotors, beams, etc.) are prepared from electro-chemically etched Si-membranes with defined thicknesses that, all movable parts are created lithographically on the SiN/sub x/O/sub y/ surface. This is followed by dry etching the monocrystalline Si-membrane down to the SiN/sub x/O/sub y/ sacrificial layer on the back side of the membrane by an RIE-process. The wafer with the movable parts is flipped onto the wafer with the already etched axis and then positioned and centred. The SiN/sub x/O/sub y/-sacrificial layer is then dissolved by a chemical wet or vapour etch process. Subsequent bonding with a Pyrex glass wafer seals the parts. (27 Refs)
Subfile: B
Descriptors: elemental semiconductors; micromechanical devices; silicon; sputter etching
Identifiers: plasma chemistry; high aspect ratio micro systems technology ; HARMST; lithography; electrochemically etched membrane; SiN/sub x/O/sub y/ sacrificial layer; LIRIE; anisotropic selective dry etching; silicon monocrystal; micro electro mechanical system; reactive ion etching; MEMS; planar RIE reactor; magnetic field; ICP source; microturbine; Si

11/16/2005 10/708936 Doty

Class Codes: B2575 (Micromechanical device technology); B2550E (Surface treatment for semiconductor devices)
Chemical Indexing:
Si sur - Si el (Elements - 1)

22/5/4
DIALOG(R)File 2:INSPEC

06756388 INSPEC Abstract Number: B9801-2340E-001
Title: A novel in situ vacuum encapsulated lateral field emitter triode
Author(s): Cheol-Min Park; Moo-Sup Lim; Min-Koo Han
Author Affiliation: Sch. of Electr. Eng., Seoul Nat. Univ., South Korea
Journal: IEEE Electron Device Letters vol.18, no.11 p.538-40
Publisher: IEEE,
Publication Date: Nov. 1997 Country of Publication: USA
CODEN: EDLEDZ ISSN: 0741-3106
SICI: 0741-3106(199711)18:11L.538:NSVE;1-R
Material Identity Number: I338-97011
U.S. Copyright Clearance Center Code: 0741-3106/97/$10.00
Document Number: S0741-3106(97)08108-1
Language: English Document Type: Journal Paper (JP)
Treatment: New Developments (N); Practical (P); Experimental (X)
Abstract: We have designed and fabricated a novel lateral field emitter triode, which is in situ vacuum encapsulated so that any troublesome additional vacuum sealing process is not required. The device exhibits low turn-on voltage of 7 V, stable current density of 2 mu A per tip, and high transconductance of 1.7 mu S per 100 tips field emitter array at V/sub AC/=22 V. An in situ vacuum encapsulation employing recessed cavities by isotropic RIE (reactive ion etch) method and an electron beam evaporated molybdenum vacuum seal are implemented to fabricate the new field emitter triode. The superb field emitter characteristics are probably due to sub-micron dimension device structure and the pencil type lateral cathode tip employing upper and lower LOCOS oxidation. (8 Refs)
Subfile: B
Descriptors: electron field emission; encapsulation; oxidation; seals (stoppers); semiconductor device packaging; sputter etching; vacuum microelectronics; vacuum techniques
Identifiers: lateral field emitter triode; in situ vacuum encapsulation; low turn-on voltage; current density; high transconductance; field emitter array; recessed cavities; isotropic RIE; electron beam evaporated Mo vacuum seal; field emitter characteristics; submicron dimension device structure; pencil type lateral cathode tip; LOCOS oxidation; 7 V; 1.7 muS; 22 V; SiO/sub 2/-Si/sub 3/N/sub 4/-Si; Mo
Class Codes: B2340E (Vacuum microelectronics); B2320 (Electron emission, materials and cathodes); B0170J (Product packaging); B2550E (Surface treatment for semiconductor devices)
Chemical Indexing:
SiO2-Si3N4-Si int - Si3N4 int - SiO2 int - Si3 int - N4 int - O2 int - Si int - N int - O int - Si3N4 bin - SiO2 bin - Si3 bin - N4 bin - O2 bin - Si bin - N bin - O bin - Si el (Elements - 2,2,1,3)
Mo int - Mo el (Elements - 1)
Numerical Indexing: voltage 7.0E+00 V; conductance 1.7E-06 S; voltage 2.2E+01 V

31/5/3
DIALOG(R)File 2:INSPEC

06098327 INSPEC Abstract Number: B9512-2550G-108
Title: Bulk micromachining of Si by lithography and reactive ion etching (LIRIE)
Author(s): Rangelow, I.W.; Hudek, P.; Shi, F.
Author Affiliation: Inst. of Tech. Phys., Kassel Univ., Germany
Journal: Vacuum vol.46, no.12 p.1361-9
Publication Date: Dec. 1995 Country of Publication: UK
CODEN: VACUAV ISSN: 0042-207X
U.S. Copyright Clearance Center Code: 0042-207X/95/$9.50+.00
Language: English Document Type: Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: This paper reports on the development of a technology which will offer the potential to manufacture micro-engines, micro-turbines, micro-sensors, micro-actuators and electronic circuits onto a single silicon chip. This technology is based on the highly anisotropic and selective dry etching of Si-monocrystals. Axes or stators (non-moving parts) are etched into the initial Si-wafer. The movable parts (rotors, beams, etc.) are prepared from electro-chemically etched Si-membranes with defined thicknesses. Both sides of the Si-membrane are covered with a 1.5 mu m SiN/sub x/O/sub y/ layer by a low stress (<10 MP) PECVD-process. After that, all movable parts are created lithographically on the SiN/sub x/O/sub y/ surface. This is followed by dry etching the mono-crystalline Si-membrane down to the SiN/sub x/O/sub y/ sacrificial layer on the reverse side of the membrane by an RIE-process. This fixes the movable parts to the SiN/sub x/O/sub y/-layer. The wafer with the movable parts is flipped onto the wafer with the already etched axis and then positioned and centred. The SiN/sub x/O/sub y/-sacrificial layer is then dissolved by a chemical wet or vapour etch process. Subsequent bonding with a Pyrex glass wafer seals the parts. (20 Refs)
Subfile: B
Descriptors: elemental semiconductors; lithography; micromachining; silicon; sputter etching
Identifiers: Si; lithography; reactive ion etching; bulk micromachining; micro-engines; micro-turbines; micro-sensors; micro-actuators; electronic circuits; axes; stators; PECVD; dry etching; dissolving; Pyrex glass wafer bonding; 1.5 mum
Class Codes: B2550G (Lithography); B2550E (Surface treatment for semiconductor devices); B2575 (Micromechanical device technology); B2520C (Elemental semiconductors)
Chemical Indexing:
Si sur - Si el (Elements - 1)
Numerical Indexing: size 1.5E-06 m

35/5/3
DIALOG(R)File 2:INSPEC

06613112 INSPEC Abstract Number: B9708-2575-004
Title: Micromachined flat-walled valveless diffuser pumps
Author(s): Olsson, A.; Enoksson, P.; Stemme, G.; Stemme, E.
Author Affiliation: Dept. of Signals, Sensors & Syst., R. Inst. of Technol., Stockholm, Sweden
Journal: Journal of Microelectromechanical Systems vol.6, no.2 p. 161-6
Publisher: IEEE,
Publication Date: June 1997 Country of Publication: USA
CODEN: JMIYET ISSN: 1057-7157
SICI: 1057-7157(199706)6:2L.161:MFWV;1-K
Material Identity Number: O938-97002
U.S. Copyright Clearance Center Code: 1057-7157/97/$10.00
Document Number: S1057-7157(97)03320-9
Language: English Document Type: Journal Paper (JP)
Treatment: Experimental (X)
Abstract: The first valveless diffuser pump fabricated using the latest technology in deep reactive ion etching (DRIE) is presented. The pump was fabricated in a two-mask micromachining process in a silicon wafer polished on both sides, anodically bonded to a glass wafer. Pump chambers and diffuser elements were etched in the silicon wafer using DRIE, while inlet and outlet holes are etched using an anisotropic etch. The DRIE etch resulted in rectangular diffuser cross sections. Results are presented on pumps with different diffuser dimensions in terms of diffuser neck width, length, and angle. The maximum pump pressure is 7.6 m H/sub 2/O (74 kPa), and the maximum pump flow is 2.3 ml/min for water. (15 Refs)
Subfile: B
Descriptors: diffusion pumps; micromachining; micropumps; sputter etching
Identifiers: flat-walled valveless diffuser pump; deep reactive ion etching; two-mask micromachining; silicon wafer; anisotropic etching; fabrication; 74 kPa; Si
Class Codes: B2575 (Micromechanical device technology)
Chemical Indexing:
Si el (Elements - 1)
Numerical Indexing: pressure 7.4E+04 Pa

35/5/4
DIALOG(R)File 2:INSPEC

06316279 INSPEC Abstract Number: B9608-2575-106, C9608-3260G-007
Title: An improved valve-less pump fabricated using deep reactive ion etching
Author(s): Olsson, A.; Enoksson, P.; Stemme, G.; Stemme, E.
Author Affiliation: Dept. of Signals, Sensors & Syst., R. Inst. of Technol., Stockholm, Sweden
Conference Title: Proceedings. IEEE, The Ninth Annual International Workshop on Micro Electro Mechanical Systems. An Investigation of Micro Structures, Sensors, Actuators, Machines and Systems (Cat. No.96CH35856) p.479-84
Publisher: IEEE, New York, NY, USA
Publication Date: 1996 Country of Publication: USA xxiv+530 pp.
ISBN: 0 7803 2985 6 Material Identity Number: XX96-00338
U.S. Copyright Clearance Center Code: 0 7803 2985 6/96/$5.00
Conference Title: Proceedings of Ninth International Workshop on Micro Electromechanical Systems
Conference Sponsor: IEEE Robotics & Autom. Soc
Conference Date: 11-15 Feb. 1996 Conference Location: San Diego, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Practical (P); Experimental (X)
Abstract: We present the first valve-less diffuser pump fabricated using the latest technology in deep reactive ion etching (DRIE). The pump is fabricated in a simple micromachining process in a double side polished silicon wafer anodically bonded to a glass wafer. Pump chambers and diffuser elements are etched in the silicon wafer using DRIE while inlet and outlet holes are etched using an anisotropic KOH-etch. The DRIE etch resulted in rectangular diffuser cross-sections. We present results on pumps with different diffuser dimensions in terms of diffuser neck width, length and angle. We reached a maximum pump pressure of 7.6 m H/sub 2/O (74 kPa) and maximum pump flow of 2.3 ml/min for water. (15 Refs)
Subfile: B C
Descriptors: fluidic devices; micromachining; micropumps; sputter etching
Identifiers: valve-less diffuser pump fabrication; deep reactive ion etching; micromachining process; double side polished Si wafer; anodic bonding; glass wafer; pump chambers; diffuser elements; anisotropic KOH-etch; rectangular diffuser cross-sections; diffuser neck width; diffuser length; diffuser angle; maximum pump pressure; maximum pump flow; methanol; water; 74 kPa; Si
Class Codes: B2575 (Micromechanical device technology); B2550E (Surface treatment for semiconductor devices); C3260G (Hydraulic and pneumatic control equipment)
Chemical Indexing:
Si sur - Si el (Elements - 1)
Numerical Indexing: pressure 7.4E+04 Pa

37/5/6
DIALOG(R)File 2:INSPEC

08937494 INSPEC Abstract Number: A2004-11-0710C-045, B2004-05-2575F-208
Title: Incrementally etched electrical feedthroughs for wafer-level transfer of glass lid packages
Author(s): Oberhammer, J.; Stemme, G.
Author Affiliation: Dept. of Signals, Sensors & Syst., R. Inst. of Technol., Stockholm, Sweden
Conference Title: TRANSDUCERS '03. 12th International Conference on Solid-State Sensors, Actuators and Microsystems. Digest of Technical Papers (Cat. No.03TH8664) Part vol.2 p.1832-5 vol.2
Publisher: IEEE, Piscataway, NJ, USA
Publication Date: 2003 Country of Publication: USA 2 vol.(xl+xxxix+1938) pp.
ISBN: 0 7803 7731 1 Material Identity Number: XX-2003-02412
U.S. Copyright Clearance Center Code: 0-7803-7731-1/03/$17.00
Conference Title: IEEE International Solid-State Sensors and Actuators Conference
Conference Sponsor: IEEE; Electron Devices Soc
Conference Date: 8-12 June 2003 Conference Location: Boston, MA, USA
Medium: Also available on CD-ROM in PDF format
Language: English Document Type: Conference Paper (PA)
Treatment: Practical (P); Experimental (X)
Abstract: This paper reports on a simple fabrication technique to create full wafer-level transferred glass-lid encapsulations for near-hermetic packaging of MEMS devices using adhesive wafer bonding with Benzocyclobutene. Furthermore, a new technique to create low-density feedthroughs through the glass wafer for electrical interconnections from the back to the front side of the glass-lids is introduced. The through-wafer vias are fabricated by combining a mechanical etch-step by powder-blasting from the back side and a subsequent short hydrofluoric acid wet etch step. The advantage of this via technique is that the major part of the via is etched without going completely through the wafer, allowing standard surface micromachining processes on the front side of the glass wafer before the final opening of the via. (10 Refs)
Subfile: A B
Descriptors: adhesive bonding; encapsulation; glass; interconnections; micromachining; micromechanical devices; packaging; sputter etching; wafer bonding
Identifiers: glass lid packages; wafer-level transferred glass-lid encapsulations; hermetic packaging; MEMS devices; adhesive wafer bonding; benzocyclobutene; electrical interconnections; powder-blasting; hydrofluoric acid wet etching; surface micromachining
Class Codes: A0710C (Micromechanical devices and systems); A8160F (Surface treatment and degradation of glasses); A5275R (Plasma applications in manufacturing and materials processing); B2575F (Fabrication of micromechanical devices); B0170J (Product packaging)
Chemical Indexing:
SiO2 int - O2 int - Si int - O int - SiO2 ss - O2 ss - Si ss - O ss (Elements - 2)